UC GEOHEALTH LABORATORY

The GeoHealth Laboratory

Prof Simon Kingham

Professor of Geography & Director of the GeoHealth Laboratory

University of Canterbury - Te Whare Wananga O Waitaha, Christchurch, NZ

National PHO CIO Meeting

Pegasus Health, Christchurch, October 19th 2015

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What is the GeoHealth Laboratory?

- A partnership between Health & Disability Intelligence (HDI), MoH, & the Department of Geography, UC
- Seeks to advance MoH policy & UC's health sciences research agenda for the mutual benefit of the New Zealand health sector
- Aims to:
  - Build a strategic partnership around health geography, spatial epidemiology, & Geographical Information Systems (GIS)
  - Increase research capacity & research outputs in health & GIS

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History

- Established in 2004
- Launched by the Minister of Health, Nov 2004 at the GeoHealth Conference, Wellington
- Formally opened on the 18th February 2005

- 6th May 2005 visited by Prime Minister, Helen Clark

"I didn't realise geography was so jazzy!"

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Staff and students

- Research staff (postdocs)
- Graduate students
  - Masters and PhD
- UC staff
  - Academics – Geography & other
  - Technical GIS & other support

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Directors

- Directors
  - Prof Simon Kingham

  - Dr Malcolm Campbell

- International Advisor
  - Prof Jamie Pearce (Edinburgh Uni)

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Current staff

- 3 postdoctoral researchers

- Dr John McCarthy

- Dr Paul Beere
- Dr Melanie Tomintz

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Current students

- Students
  - Niamh Donnellan 
  - Alison Watkins 
  - Daniel Hogg 
  - Robert Poynter 
  - Kirsty Curry 
  - Allan Schori 
  - Jesse Wiki 

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Graduates

- Kurt Janssen (PHI intern) - MoH, MfE, ESRI (California), Interpret (ChCh)
- Katherine Tisch (Masters) – ESR, GeoHealth Lab, Edinburgh Uni
- Erin Holmes (Masters) - MoH (Wellington)
- Kate McPherson (Masters) - CCC (Christchurch)
- Laura Miller (PhD) - (AAG '*best thesis*' winner 2008), Researcher (Perth, Aus)
- Jeff Wilson (PhD) – Harvard Uni (postdoc), Dean, Huston-Tillotson Uni, US
- Chris Bowie (Masters) – Researcher (GeoHealth Laboratory), Researcher (Opus)
- Sam Valentine (Masters) - Project Manager, Appian Group (Sydney)
- Matt Willoughby (Masters) - Canterbury District Health Board
- Kimberley Reed (Masters GIS) – GIS Analyst at Marlborough Lines Ltd
- Dan Nutsford (Masters GIS) – GIS professional in UK
- Jayden MacRae (Masters) – CEO, Patients First, Wellington
- Nick Brunsdon (Masters) – Economic analyst, CDC, Christchurch

How the work program is planned

- Long term program
  - Ongoing negotiation
  - MoH priorities
- Urgent requests

How the work is done – and engagement opportunities

- Postdocs
  - MoH approved projects
- Students
  - MoH scholarship funded PhD and Masters these
  - Other PhD and Masters theses
  - GEOG420 Individual research projects (0.25 EFTS)
  - GISC411 (GIS and Health) projects (0.125 EFTS)
  - GEOG/GISC415 Internships (150/100 hrs)
  - Summer scholarships (50/50 co-funded)

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GISC411 Research Topics

- Sunshine exposure & mental health
- Do people with long term health conditions (using the NZHS) live nearer or further from GPs and/or hospitals?
- Is there any relationship between physical activity rates (using NZHS) & proximity to walking tracks (from koordinates.com)?
- Is there a Relationship between Alcohol Consumption & Proximity to Alcohol Outlets in New Zealand?
- Does Tobacco Outlet Exposure in New Zealand Influence Smoking Behaviours?
- Are there Spatial and Social Gaps in the Provision of Audiologist Services in New Zealand?

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Research themes

New Zealand Sociology Volume 28 Issue 3 2013

Variation in health and social equity in the spaces where we live: A review of previous literature from the GeoHealth Laboratory

Christopher Bowie, Paul Beere, Edward Griffin, Malcolm Campbell & Simon Kingham

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Indices of access to factors in the built environment

- Creation of exposure indices e.g.
  - Green (parks) and blue (water) space
  - Key resources and destination
  - Social cohesion and isolation
  - Travel time network
  - Urban/rural
  - Earthquakes

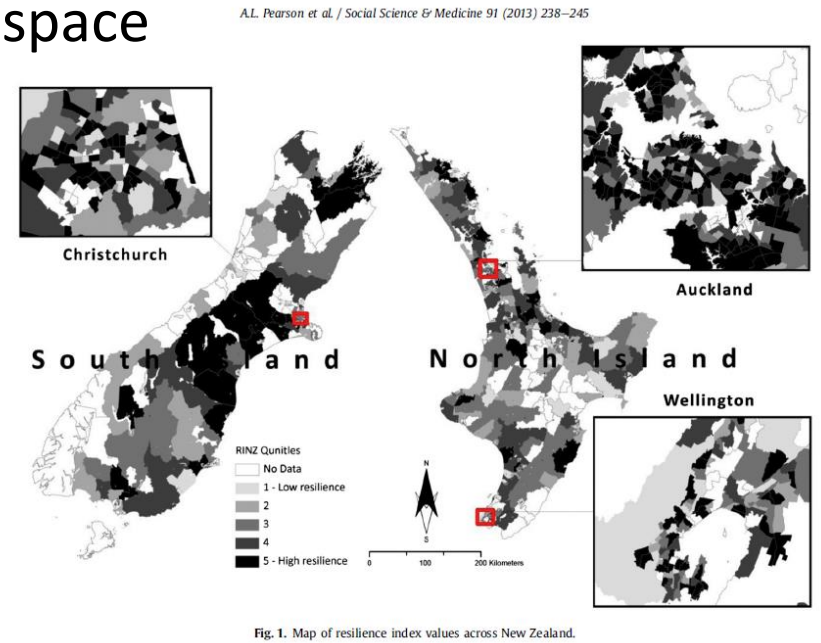
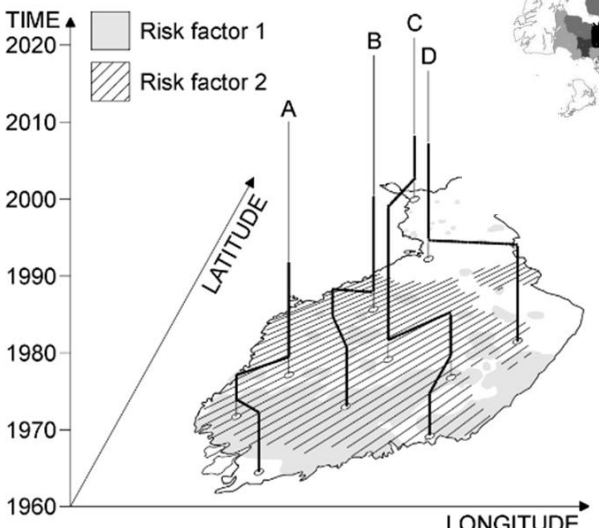


Fig. 1. Map of resilience index values across New Zealand.



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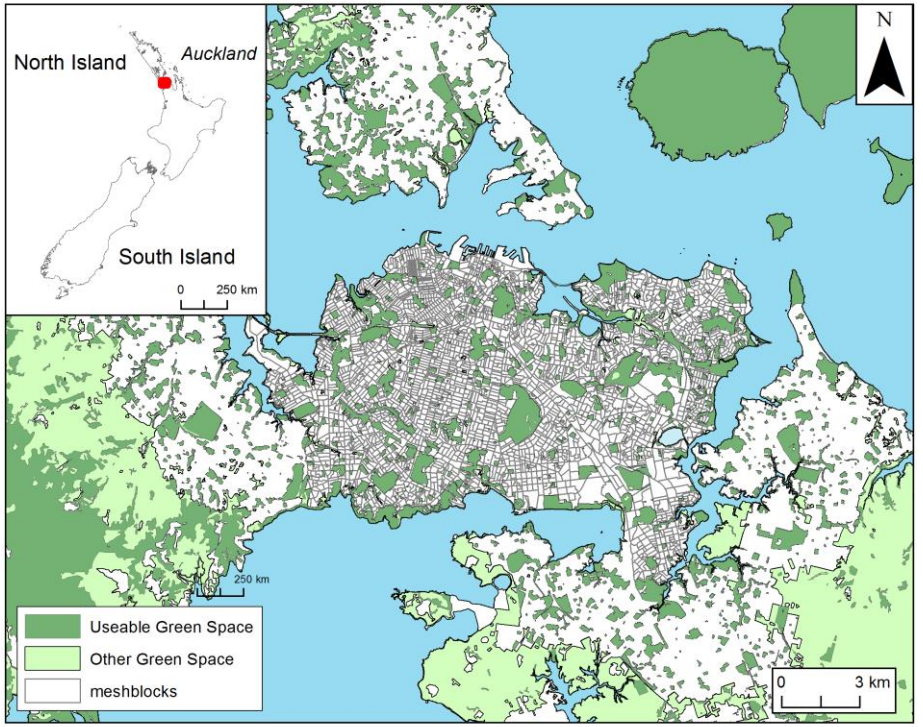
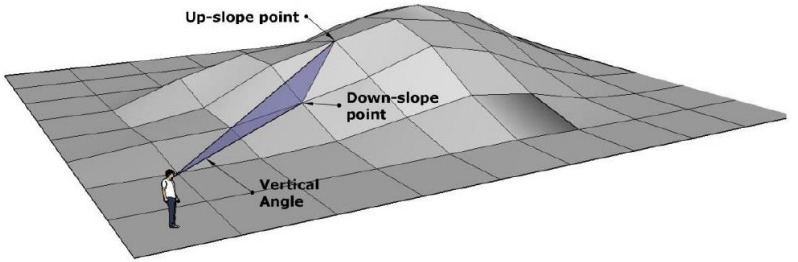
Access to neighbourhood destinations

- Access to '*unhealthy*'
  - Tobacco
  - Alcohol
  - '*Unhealthy*' food sources
  - Gambling opportunities
- Access to '*healthy*'
  - Green and blue space
    - proximity vs visual
    - Useable vs non-useable





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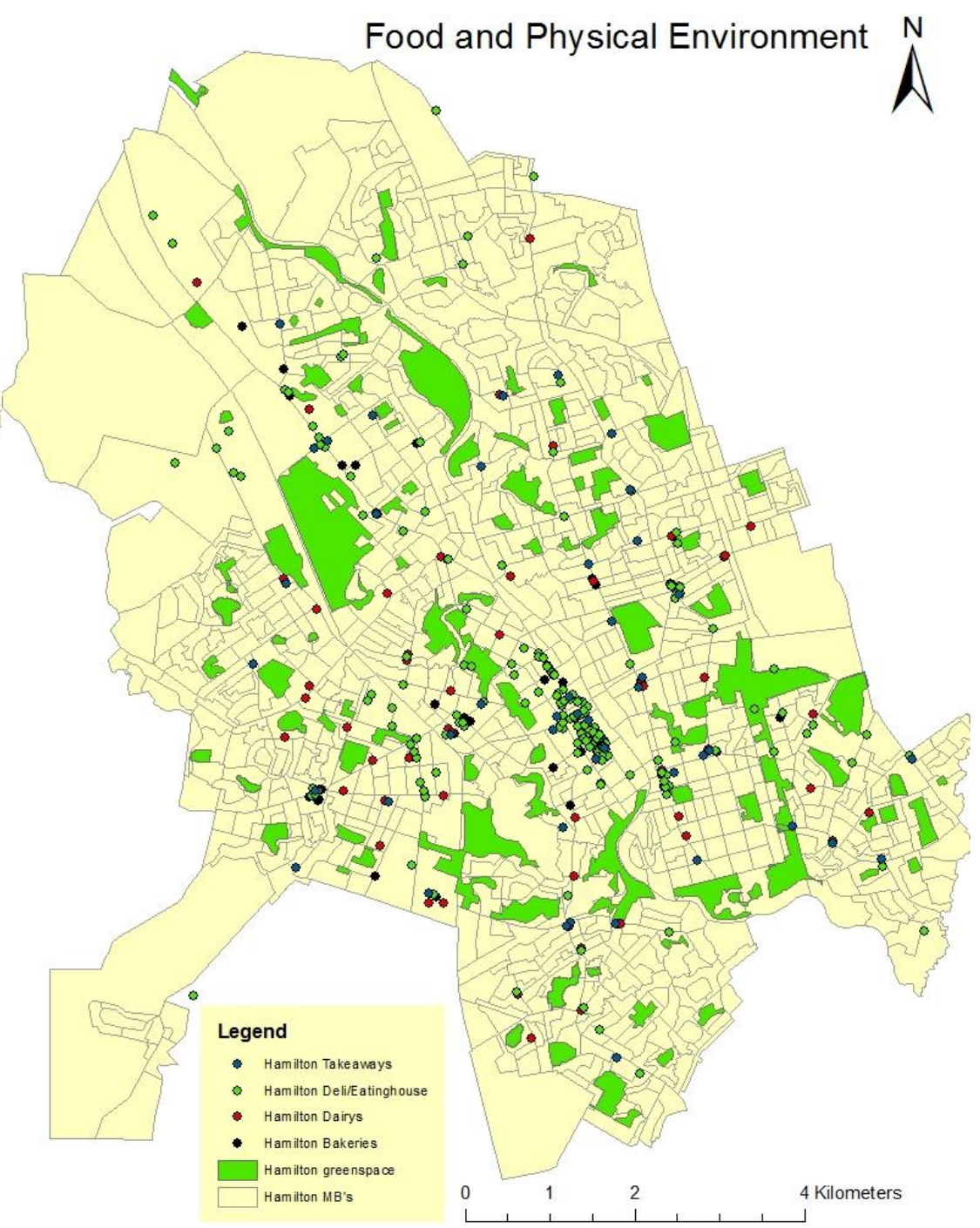

- Food Environment
  - Takeaways
  - Deli/Eating houses
  - Dairies
  - Bakeries
- Physical Environment
  - Green space

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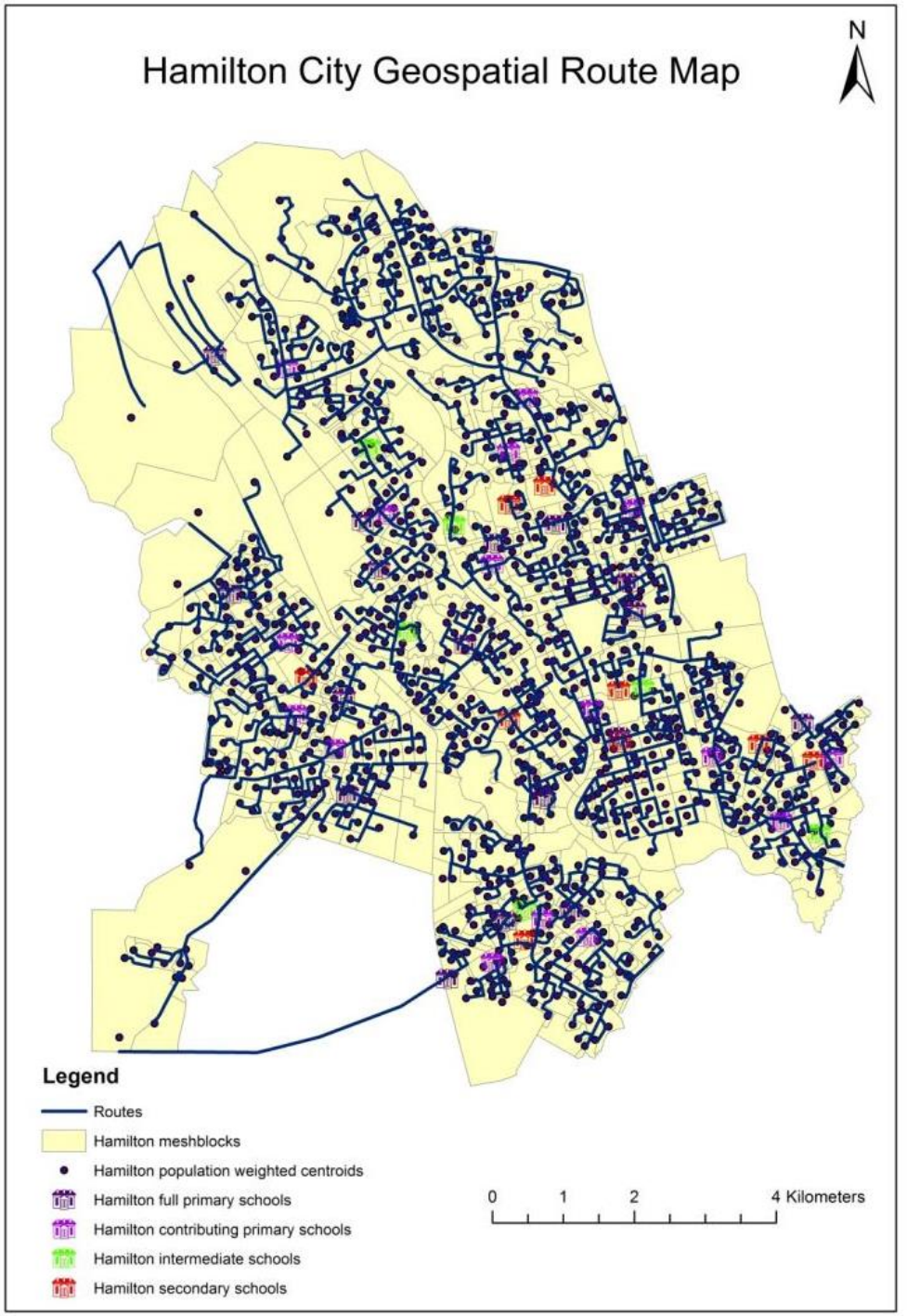

Network Route Analysis

- Closest Facility Network
  - Schools
  - Pop weighted Centroids
- Match the NZHS child to the nearest age/gender appropriate school

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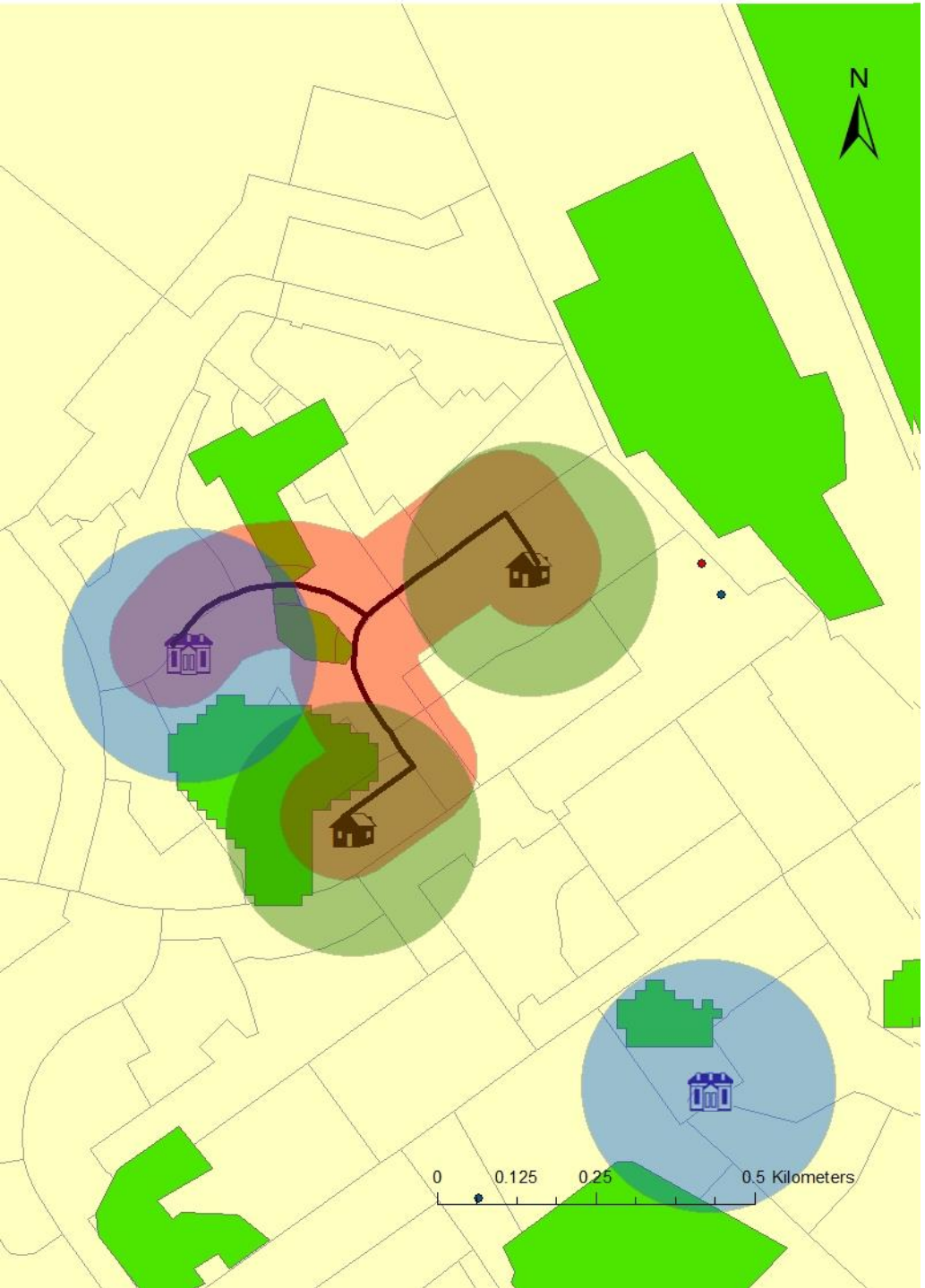

Neighbourhood Environment – Route Buffer

- Food environment vs Physical environment
- 200 metre buffer round school & home
- 30 metre & 100metre buffer round route

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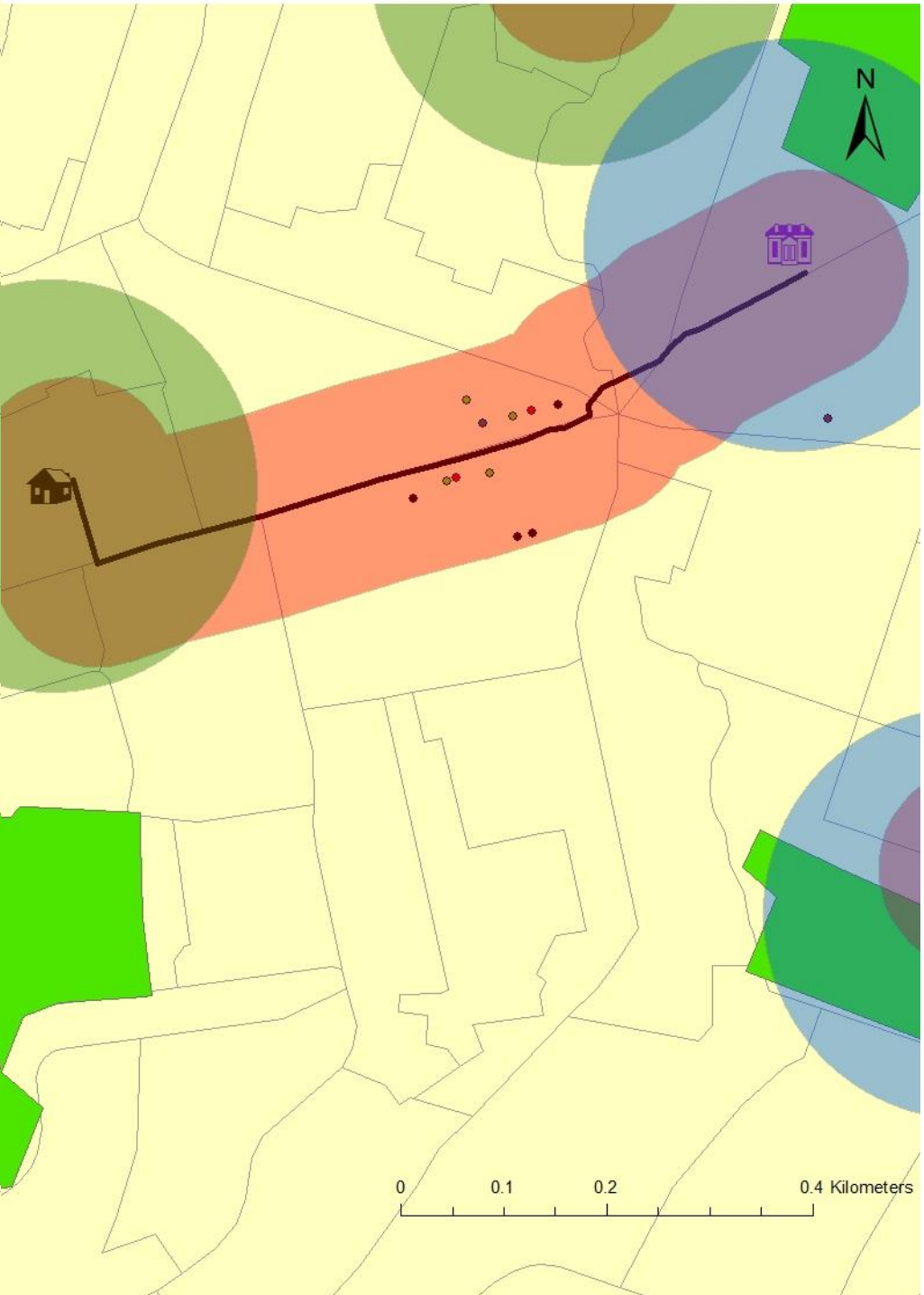

Neighbourhood Environment

- Food environment vs Physical environment
- Closest Facility Network Analysis
- 30 metre buffer zone
- 100 metre buffer zone

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Air pollution

- Exposure to air pollution
- Environmental justice
- Health impact

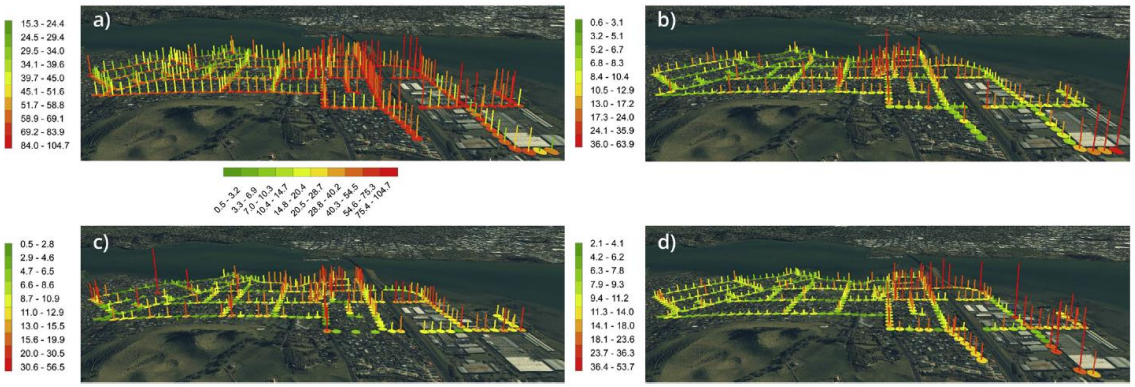

Fig. 12. Median UFP concentrations (pt/cm^3 × 10^3) for Mangere Bridge – a) early morning b) midday c) late afternoon and d) late evening.

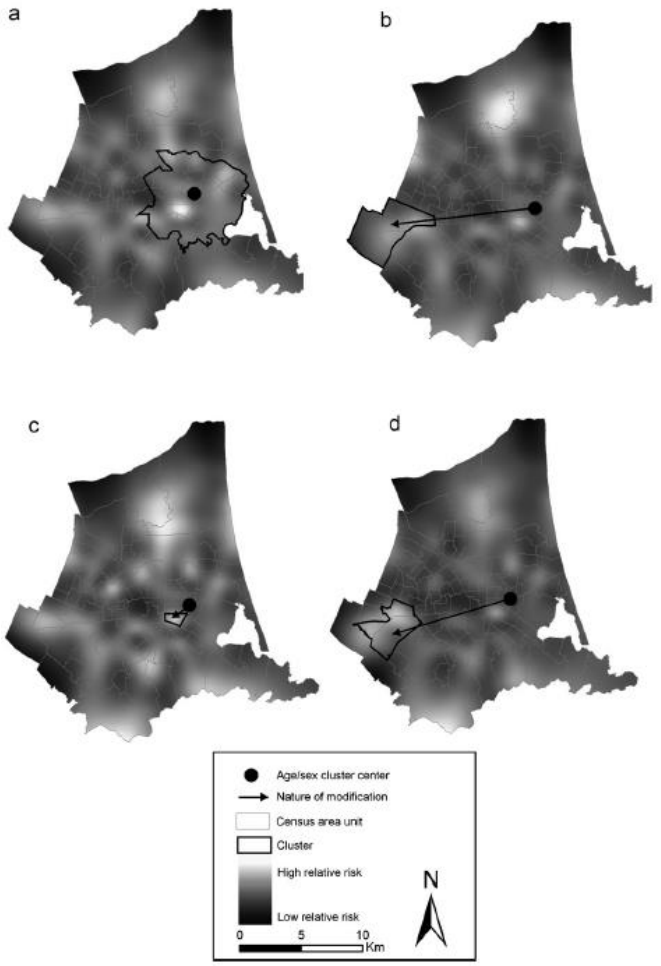

Fig. 2. Spatial patterns of relative risk and spatial relocation of pneumonia and influenza clusters after adjusting for (a) age and sex; (b) age, sex and deprivation; (c) age, sex and air pollution; (d) age, sex, air pollution and deprivation. Arrows indicate the distance and direction from the centre of the age/sex cluster to covariate-adjusted clusters with the endpoint of the vector marking the new centre.

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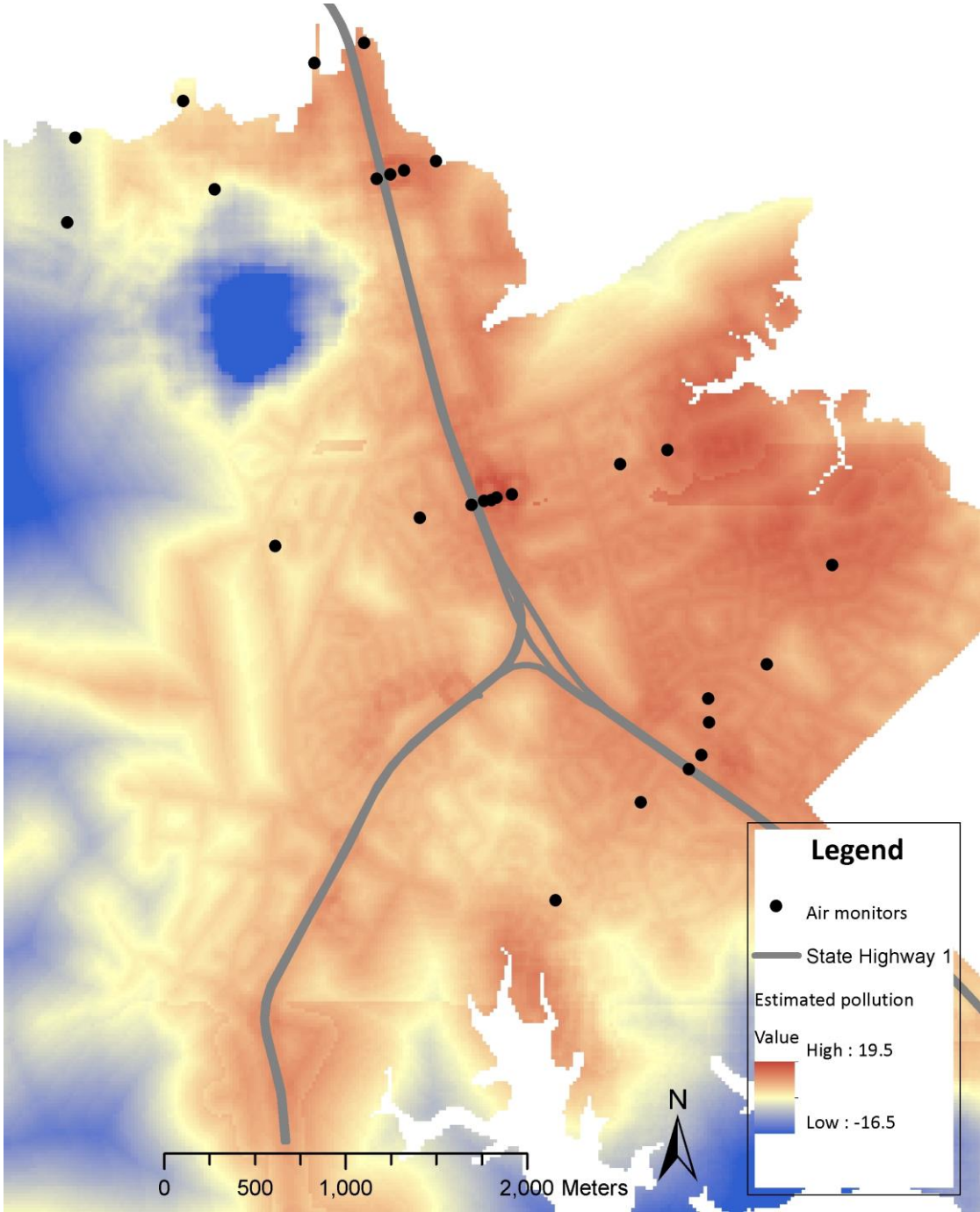
Air pollution

- Land use regression (LUR) modelling



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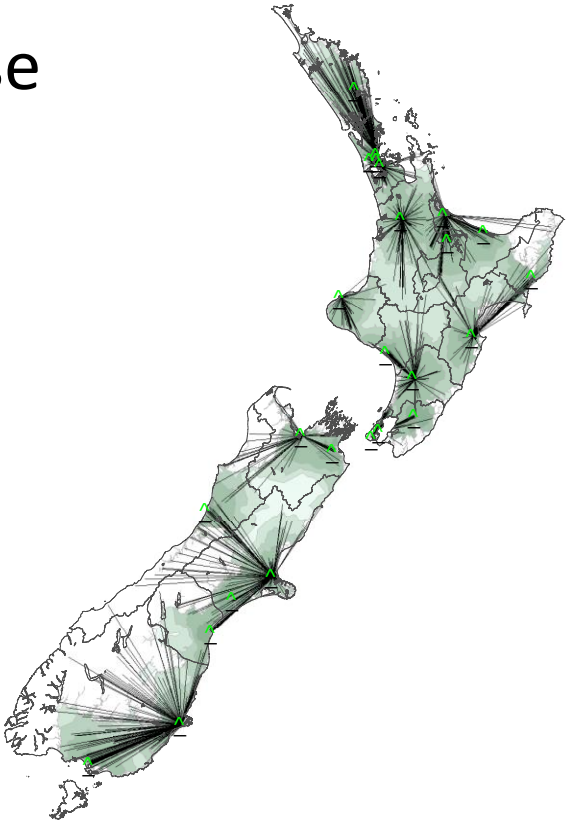
Inequalities in access to and utilisation of health services

- Neighbourhood deprivation & hospital admissions
- Neighbourhood deprivation & GP use
- Travel time and GP use
- Road closure and health access
- Healthline
- Quitline



		Within 30 minutes		Within 1 hour	
Drive-time scenario	Hospitals	Pop	%	Pop	%
All 24/7 ED Hospitals	25	3,347,940	80.2	3,858,940	**92.5**
Major Hospitals	**13**	**2,880,390**	**69.0**	**3,330,410**	**79.8**

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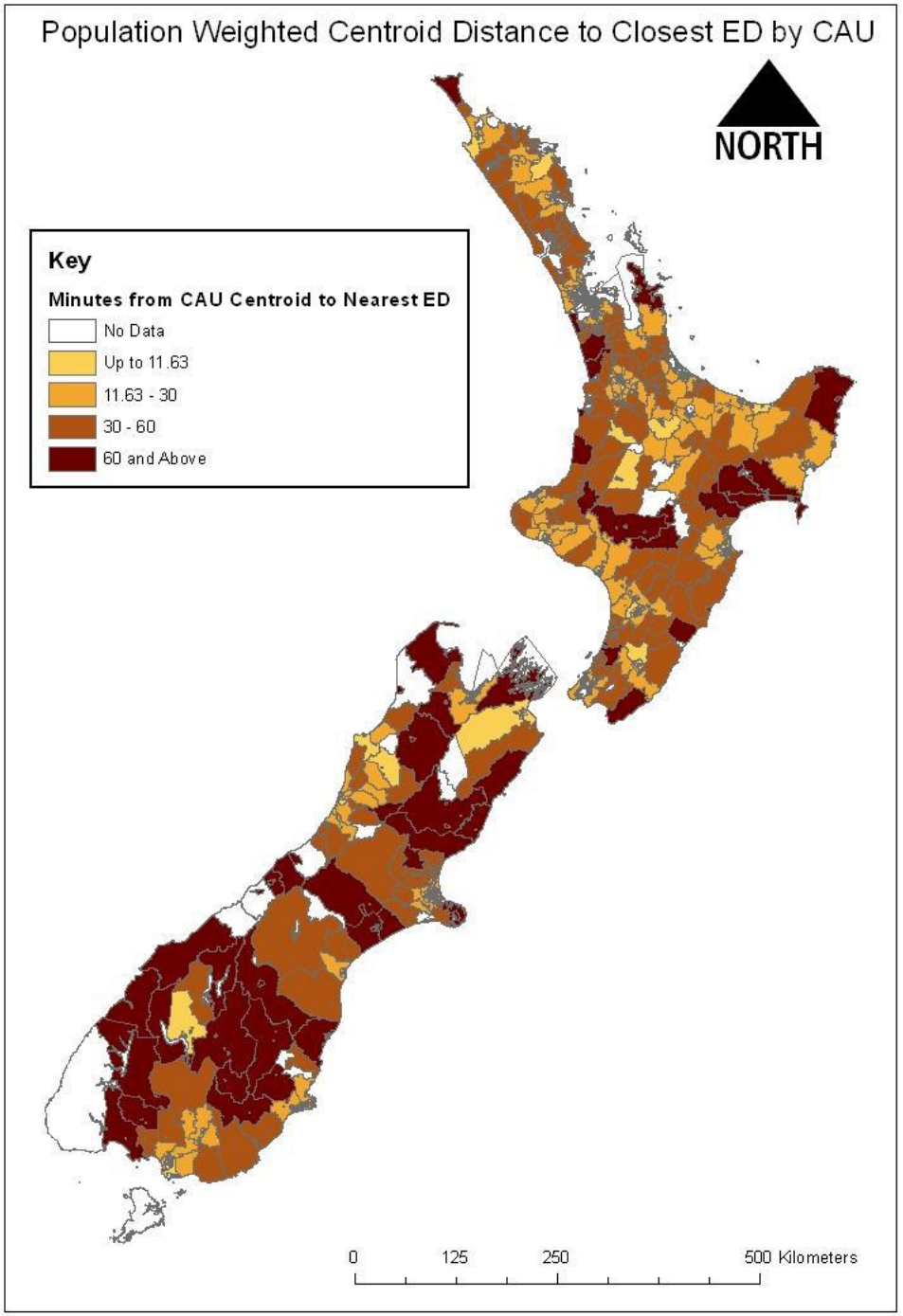
Calls to Healthline and subsequent patient action



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Patient ‘tracking’ and personal health

- The Sensing City and Health: COPD pilot project

- Track inhaler use among COPD patients

Smartinhalers

- Inhalers (e.g. Ventolin, Duolin) are used to provide relief and symptom control in COPD
- Frequency of inhaler use provides an indication of symptoms
- Knowledge of inhaler use (***when, where, if***) will help management of COPD
- Trackable 'Inhaler' monitors:
    - **Time and location** of use (link to phone)
    - The dispensing of medication
    - The air temperature at point of use

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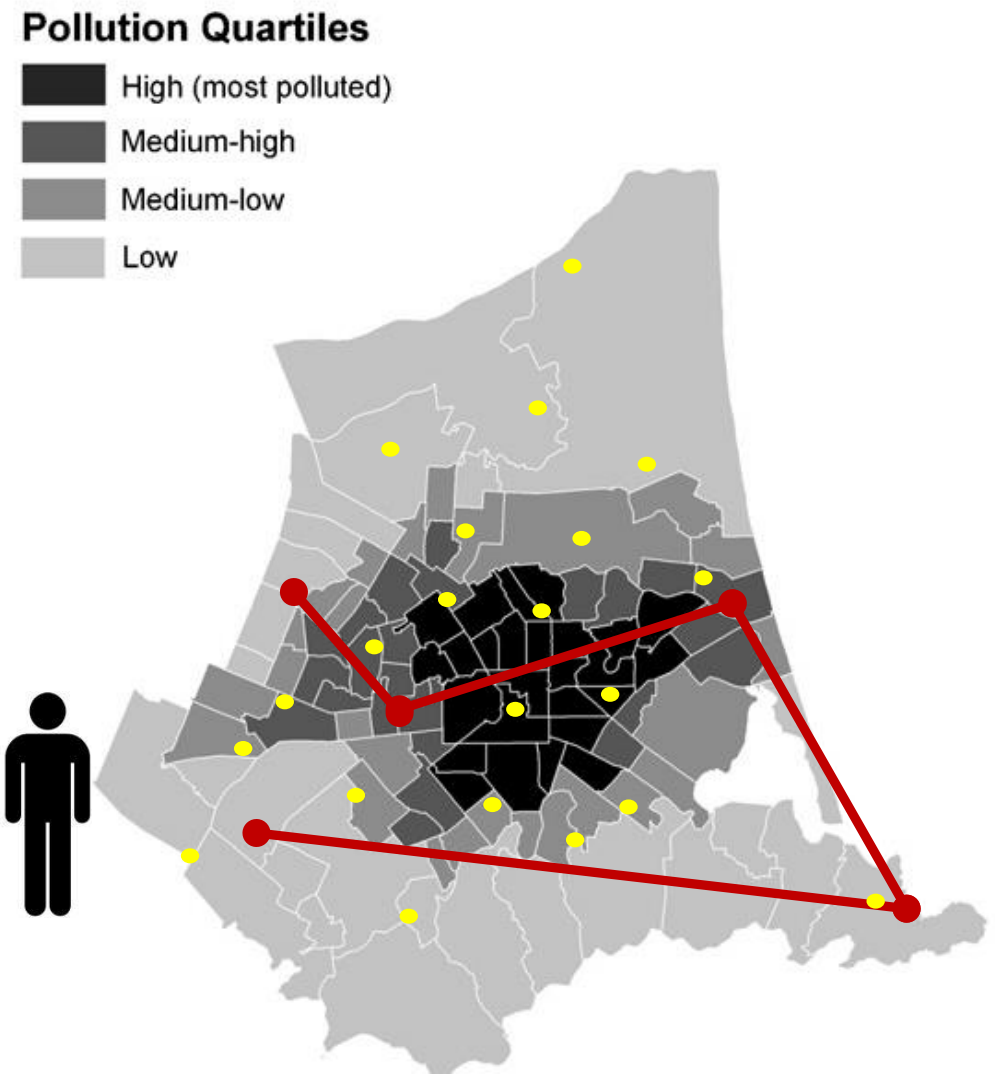
Real time ‘risk’

- Accurately assigning exposure
- Following ‘patient’
- How does COPD condition alter as (s)he moves through the smart city?
- Know when and where pollution is higher + smartinhaler data + real time



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Summary

- GeoHealth Laboratory 11 years old
- Collaboration between MoH and UC
- Applied research
- Academically robust
  - over 80 peer reviewed papers
- Capability building through scholarship program
- Opportunities to engage

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